1. An analysis method for analyzing height-scanning interferometry data from a test surface, the method comprising:

calculating a coherence profile and a phase profile for the test surface based on the data;

calculating an experimental phase gap map based on a difference between the phase profile and the coherence profile;

filtering the experimental phase gap map to remove noise; and

using the filtered phase gap map to determine a height profile of the test surface.

2. The method of claim 1, wherein the data comprises an intensity signal $I(\zeta, x)$ produced by interfering a measurement wavefront reflected from the test surface with a reference wavefront reflected from a reference surface, where the wavefronts are derived from a common source, ζ is a scan position for the reference surface, and **x** is a field position corresponding to an object position on the test surface.

3. The method of claim 2, wherein the coherence profile is calculated from a localization of interference fringes in the intensity signal with respect to the scan position ζ.

4. The method of claim 2, wherein the coherence profile is calculated from a wavevector dependence of a phase ϕ of a transform of $I(\zeta, x)$ with respect to the scan position ζ.

5. The method of claim 4, wherein the transform is a Fourier transform.

6. The method of claim 2, wherein the phase profile is calculated from an interferometric phase of $I(\zeta, x)$ at a nominal wavevector k_0.

7. The method of claim 6, where in the phase profile is calculated from a phase of a transform of $I(\zeta, x)$ with respect to the scan position ζ at a nominal wavevector k_0.

8. The method of claim 7, wherein the transform is a Fourier transform.

9. The method of claim 1, wherein the experimental phase gap map is calculated by expressing the coherence profile and the phase profile in common units.

10. The method of claim 9, wherein the coherence profile is expressed in radians with respect to a nominal wavevector k_0 according to $\Theta(x) = k_0 h_C(x)$, where $h_C(x)$ is a surface height profile of the test surface derived from the coherence profile, and wherein the phase profile is calculated as the interferometric phase $\theta(x)$ in radians of the height scanning interferometry data at the nominal wavevector k_0.

11. The method of claim 10, wherein the experimental phase gap map $G_{ex}(x)$ equals $\theta(x) - \Theta(x)$.

12. The method of claim 11, wherein a difference between the experimental phase gap map $G_{ex}(x)$ and a theoretical phase gap map $G(x) = \gamma(x) - k_0\tau(x)$ is indicative of agreement between the coherence profile of the test surface and the phase profile of the test surface, wherein $\gamma(x)$ is a value of a phase offset at the nominal wavevector k_0 produced by reflections from the test surface and elements of the interferometer used to measure the interferometry data, and $\tau(x)$ is a value of linear dispersion in the phase offset with respect to wavevector.

13. The method of claim 12, further comprising determining values for $\gamma(x)$ and $\tau(x)$.

14. The method of claim 1, wherein filtering the experimental phase gap map comprises calculating a global average of the experimental phase gap map.

15. The method of claim 14, wherein calculating the global average comprises calculating at least one trigonometric function for each of multiple points of the experimental phase gap map, averaging the results of each trigonometric function, and calculating an inverse trigonometric function based on each trigonometric average to determine the global average of the experimental phase gap map.

16. The method of claim 15, wherein calculating the at least one trigonometric function for the multiple points comprises calculating a sine map and a cosine map based on the experimental phase gap map, and wherein the inverse trigonometric function is based on an arctan2 function.

17. The method of claim 1, wherein filtering the experimental phase gap map comprises calculating at least one trigonometric function for each of multiple points of the experimental phase gap map, smoothing the results of each trigonometric function over the multiple points, and calculating an inverse trigonometric function of the smoothed results to determine the filtered phase gap map.

18. The method of claim 17, wherein calculating the at least one trigonometric function for the multiple points comprises calculating a sine map and a cosine map based on the experimental phase gap map, and wherein the inverse trigonometric function is based on an arctan2 function.

19. The method of claim 17, wherein smoothing the results of each trigonometric functions comprises using a convolution function.

20. The method of claim 17, wherein smoothing the results of each trigonometric functions comprises averaging the results among adjacent points.

21. The method of claim 1, wherein calculating the experimental phase gap map comprises smoothing the coherence profile to round edges in the coherence profile, and calculating the experimental phase gap map based on a difference between the phase profile and the smoothed coherence profile.

22. The method of claim 1, wherein filtering the experimental phase gap map comprises smoothing the coherence profile to round edges in the coherence profile, and determining the filtered phase gap map based on a difference between the phase profile and the smoothed coherence profile.

23. The method of claim 1, wherein filtering the experimental phase gap map comprises calculating a variance map of the experimental phase gap, filtering the experimental phase gap map with each of multiple algorithms, and calculating the filtered phase gap map based on a locally weighted average of the algorithm outputs, wherein the local weights are based on the variance map.

24. The method of claim 23, wherein calculating the variance map comprises calculating at least one trigonometric function for each of multiple points of the experimental phase gap map, smoothing the results of each trigonometric function over the multiple points, and determining the variance map based on the smoothed trigonometric functions.

25. The method of claim 1, wherein using the filtered phase gap map comprises connecting the filtered phase gap map to remove 2π phase steps.

26. The method of claim 25, wherein the using the filtered phase gap map further comprises fitting the connected filtered phase gap map to a polynomial function and using the polynomial function to improve an estimate for a height profile of the test surface.

27. The method of claim 25, wherein using the filtered phase gap map further comprises determining a relative fringe order profile by determining a multiple of 2π nearest to a difference between the experimental phase gap map and the connected filtered phase gap map.

28. The method of claim 27, wherein using the filtered phase gap map further comprises determining a relative height profile of the test surface based on the phase profile and the relative fringe order.

29. The method of claim 25, wherein using the filtered phase gap map further comprises determining an absolute fringe order based on the experimental phase gap map, the connected filtered phase gap map, and a theoretical phase gap map $G(x)=\gamma(x)-k_0\tau(x)$, where the phase profile is calculated with respect to a nominal wavevector k_0, $\gamma(x)$ is a value of a phase offset at the nominal wavevector k_0 produced by reflections from the test surface and elements of the interferometer used to measure the interferometry data, and $\tau(x)$ is a value of linear dispersion in the phase offset with respect to wavevector.

30. The method of claim 29, further comprising determining values for $\gamma(x)$ and $\tau(x)$.

31. The method of claim 29, wherein using the filtered phase gap map further comprises determining an absolute height profile of the test surface based on the phase profile and the absolute fringe order.

32. An interferometric analysis method comprising:

providing a coherence profile and a phase profile derived from height-scanning interferometry data for a test surface;

calculating a filtered phase gap map based on a difference between the phase profile and the coherence profile; and

using the filtered phase gap map to determine a height profile of the test surface.

33. The method of claim 32, wherein calculating the filtered phase gap map comprises smoothing the coherence profile to round edges in the coherence profile, and calculating the filtered phase gap map based on a difference between the phase profile and the smoothed coherence profile.

34. An interferometric analysis method for measuring surface roughness based on height-scanning interferometry data for a test surface, the method comprising:

calculating a coherence profile and a phase profile for the test surface based on the data;

calculating an experimental phase gap map based on a difference between the phase profile and the coherence profile; and

determining a surface roughness profile based on the experimental phase gap map.

35. The method of claim 34, wherein determining the surface roughness profile comprises calculating a variance map of the experimental phase gap map and determining the surface roughness profile based on the variance map.

36. The method of claim 35, wherein calculating the variance map comprises calculating at least one trigonometric function for each of multiple points of the experimental phase gap map, smoothing the results of each trigonometric function over the multiple points, and determining the variance map based on the smoothed trigonometric functions.

37. An interferometry system comprising:

a height-scanning interferometer which during operation measures height-scanning interferometry data for a test surface; and

an electronic processor coupled to the height-scanning interferometer, wherein during operation the electronic processor: calculates a coherence profile and a phase

profile for the test surface based on the data; calculates an experimental phase gap map based on a difference between the phase profile and the coherence profile; filters the experimental phase gap map to remove noise; and uses the filtered phase gap map to determine a height profile of the test surface.

38. An interferometry system comprising:

a height-scanning interferometer which during operation measures height-scanning interferometry data for a test surface; and

an electronic processor coupled to the height-scanning interferometer, wherein during operation the electronic processor: calculates a coherence profile and a phase profile for the test surface based on the data; calculates a filtered phase gap map based on a difference between the phase profile and the coherence profile; and uses the filtered phase gap map to determine a height profile of the test surface.

39. An interferometry system comprising:

a height-scanning interferometer which during operation measures height-scanning interferometry data for a test surface; and

an electronic processor coupled to the height-scanning interferometer, during operation the electronic processor: calculates a coherence profile and a phase profile based on the data; calculates an experimental phase gap map based on a difference between the phase profile and the coherence profile; and determines a surface roughness profile based on the experimental phase gap map.

40. A computer readable medium comprising a program that causes a processor to perform the steps of claim 1.

41. A computer readable medium comprising a program that causes a processor to perform the steps of claim 32.

42. A computer readable medium comprising a program that causes a processor to perform the steps of claim 34.